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Tackling CO₂ Emissions from International Aviation: Challenges and Opportunities Generated by the Market Mechanism 'CORSIA'

Dr Axel Michaelowa

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Executive Summary

- While under the Paris Agreement of 2015 all countries have agreed to contribute to greenhouse gas reduction to keep global warming below 2°C, international aviation so far has been exempt from any measures to reduce greenhouse gas emissions.
- Global emissions from aviation currently reach 0.8 billion tonnes of carbon dioxide (CO₂) – 2% of overall CO₂ emissions – and are increasing by about 50 million tonnes of CO₂ per year. This growth is expected to accelerate to 67–200 million tonnes per year between 2020 and 2050.
- After many years of discussion and negotiation, the International Civil Aviation Organization (ICAO) has agreed on a market mechanism to offset emissions growth from international air travel after 2020. This mechanism, called the Carbon Offsetting and Reduction Scheme for Aviation (CORSIA), is to kick in from 2021, albeit only in a voluntary form until 2027, and will then run until 2035. After 2027 it will cover countries that collectively generate around 89% of total international aviation volume.
- A total of 66 countries covering 86.5% of international aviation volume have agreed to participate in CORSIA from the beginning, including the United Arab Emirates (UAE) and Qatar. Airlines from participating countries need to buy offset credits from projects or programmes that reduce greenhouse gas emissions to cover any increases of emissions from 2020 levels.
- Eligible offset mechanisms include the Clean Development Mechanism (CDM) and Joint Implementation under the Kyoto Protocol, and the new mechanisms under Article 6 of the Paris Agreement. So far, no specific quality criteria for offsets have been agreed, nor whether offsets from the voluntary market can be used.
- Using a possible price range of €1–5 per offset, global costs for offset purchase would reach €60–850 million in 2021 and then increase linearly. As airlines from UAE and Qatar cover about 11.5% of global aviation volume, their costs for offset purchase may reach €7–100 million in 2021 and €70–1000 million in 2030.
- The UAE government can use its seat in the ICAO Council to influence the range of offset schemes eligible for CORSIA as well as the criteria used to differentiate among offsets. It should ensure that projects under the CDM and other offset programmes which have been developed in the Gulf Cooperation Council (GCC) countries can generate offsets eligible under CORSIA.
- This paper argues that voluntary market offsets should not be eligible in order to prevent civil society and media backlash against offsets of doubtful quality. Including past vintages of CDM credits would allow to quickly harness supply and cover up to a decade worth of demand.
- If GCC governments want to boost their own industry that develops greenhouse gas mitigation solutions such as solar energy, they could rule that for the first phase of CORSIA their airlines have to buy offsets from CDM projects in the GCC region. This would ensure a high reputation for the GCC countries' approach. It would also mean that revenues from offset sales would accrue within the GCC, and support economic diversification. On the other hand, offset prices may be higher than if there is open access to the global offset markets.

The Issue

The International Civil Aviation Association (ICAO), the United Nations body overseeing the aviation sector, has developed a global policy instrument to address greenhouse gas emissions from international flights. International aviation currently is responsible for about 2% of global CO₂ emissions, namely 0.8 billion tonnes of CO₂ in 2015.¹ Emissions are expected to increase rapidly: by 2020 they are likely to be 70% higher than in 2005, at around 1 billion tonnes of CO₂, and from 2020 to 2050 they could grow by 300–700%, i.e. to 3–7 billion tonnes of CO₂.² This would mean a share of 4–8% of global greenhouse gas emissions.

One year ago, the Paris Agreement to the UN Framework Convention on Climate Change (UNFCCC) was agreed upon, which includes the long term goal to limit global average temperature increase to 2°C and to strive for limiting it to 1.5°C. During the last year, an unexpectedly rapid ratification process took place in many countries so that the Paris Agreement already entered into force on 4 November 2016. While aviation is not explicitly mentioned in the Agreement, it is – in contrast to the Kyoto Protocol – also not explicitly excluded. There is the understanding that the PA refers to anthropogenic greenhouse gas emissions, which would hence also include aviation emissions.

For many years now, the ICAO has discussed how greenhouse gas emissions could be addressed and has set the aspirational target of carbon neutral growth from 2020. After intense negotiations, the 38th ICAO General Assembly (GA) decided in 2013 that it would finalize the development of a global market mechanism by 2016. A market mechanism allows to harness the lowest cost emission reduction options through transfer of emission reduction units. This mechanism is part of a basket of measures, including technology, operational improvements and sustainable alternative fuels.³

At the 39th GA, in October 2016, the design of the market mechanism – the so-called Carbon Offsetting and Reduction Scheme for Aviation (CORSIA) – was decided upon after intense negotiations. The CORSIA shall address CO₂ emissions above the 2020 level, thereby contributing to the goal of carbon neutral growth from 2020 onwards. It will start in a voluntary form from 2021 and become binding for most countries from 2027 onwards. Emission units from existing or future market mechanisms under the UNFCCC shall be eligible for meeting the CORSIA offsetting requirements.

This paper analyses the challenges and opportunities of the CORSIA and its implications for countries of the Gulf Cooperation Council (GCC) and their airlines.

Relevance for the UAE and Other GCC Countries

The agreement on the CORSIA has several consequences for the UAE and other GCC countries, including:

- As soon as GCC countries decide to join the CORSIA, their airlines need to acquire offsets for CO₂ emissions from routes between two participating states which go beyond their 2020 emissions levels. Airlines from the UAE and Qatar, such as Emirates, Etihad and Qatar Airways, will have to do this from 2023 for most of their routes. Assuming that the share in global emissions is equal to the share in international aviation volume, this would require outlays of €7–100 million/year to cover offset needs for 2021. Given that offset requirements increase annually by the growth of flight volume, the outlays for offset acquisition could multiply by a factor of ten until 2030.
- Governments need to introduce regulation to ensure compliance of their airlines with the CORSIA and to have a monitoring, reporting and verification system in place from 2019 onwards.
- If the offset price increases significantly, airlines from the GCC countries may want to invest in more efficient aircrafts to reduce emissions and offsetting requirements. Determination of the price level at which this would occur requires specific research.

Development of the Market Mechanism for International Aviation

Historical development: Negotiations on a global market mechanism for aviation have been ongoing for many years, both under the ICAO and UNFCCC, where several attempts to cover emissions from aviation failed. Already a decade ago, the ICAO Committee on Aviation Environmental Protection discussed different options for such a mechanism.⁴ Discussions intensified after the EU decided to include aviation emissions in their emission trading scheme and faced strong opposition from many countries. Consequently, the EU decided to ‘stop the clock’ for the inclusion of emissions from all incoming and outgoing flights in its trading scheme until the ICAO GA in 2013.

In 2013, the ICAO GA decided to develop a global market mechanism, which it decided should be finalized by the next GA in 2016 'for the implementation of the scheme from 2020...'.⁵ and negotiations intensified. Initially, it was foreseen to have a mandatory approach with criteria related to economic development and aviation activity⁶ from 2020, but then general pressure led to a phased approach.

Development at the 39th GA 2016: While a well advanced draft for the market mechanism existed before the GA, there were still critical issues to be negotiated at the GA. One of these was how offset requirements are to be distributed among airlines (a sectoral versus an individual approach – see below), since developing countries have contributed less to historic emissions but their airlines are expecting larger growth and would hence be more strongly affected by the individual approach.

Moreover, the GA specified that emissions units from market mechanisms under the UNFCCC are automatically eligible. These market mechanisms have allowed governments to acquire emissions units from eligible emission reduction projects and programmes to fulfil their emissions targets under the Kyoto Protocol and to reach their contribution under the Paris Agreement. The GA also introduced the requirement to avoid double counting of emissions reductions. While the initial draft included a reference that aviation's share of the global CO₂ emissions budget should be in line with temperature goals of the Paris Agreement was deleted, now the temperature goals of the Agreement are only mentioned in the decision's preamble.⁷

The EU will review the ICAO outcome early next year before deciding whether to include international aviation in the EU emissions trading scheme again.⁸

Positions of the UAE and GCC countries: Already in 2013, the UAE indicated that a market mechanism is 'of utmost importance' to achieve the ICAO's aspirational emissions goal and that a phased-in approach with

route-based exemptions should be used to reflect the principle of common but differentiated responsibilities and hence to consider the special needs of developing countries.⁹ To ensure non-discrimination, the UAE emphasized that the same rules need to apply to all airlines on the same route. Also, in the view of the UAE, the application of a *de minimis* threshold for airlines to be included – namely that airlines with a flight volume below the threshold level should be exempted – would contradict the principle of non-discrimination. But at the same time, as long as the non-discrimination principle would not be violated the UAE would support excluding airlines with an insignificant level of emissions.¹⁰

With regard to the GA resolution of 2013, Qatar had criticised it for not recognising action of early movers which might not motivate airlines to invest early on in efficiency improvements.¹¹ This was repeated at GA 39 and supported by the UAE.

The UAE and Qatar are the only GCC countries which have so far declared their intention to participate in CORSIA from the beginning.¹² However, the UAE has requested a full economic study on the implication of moving from sectoral to individual shares (see discussion below) and indicated that the sectoral share should remain at least at 50%.

Key Features of the CORSIA

General functioning and governance: Under the CORSIA, airlines need to offset emissions from flights between two participating countries which go beyond their 2020 emission levels in a phased approach. Countries voluntarily participate in the pilot phase (2021–2023) and/or the first phase (2024–2026), and have to participate in the second phase (2027–2035) unless exempted (see below).¹³ The scheme can be extended beyond 2035. A total of 66 countries, representing 86.5% of total international aviation emissions have communicated that they intend to join the CORSIA already from the pilot phase (see Box 1).

Box 1: Countries Intending to Join the CORSIA from the Pilot Phase 2021–2023.

- **Africa:** Burkina Faso, Kenya, Zambia,
- **Americas:** Canada, Costa Rica, Guatemala, Mexico, the United States,
- **Asia-Pacific:** Australia, China, Indonesia, Israel, Japan, Malaysia, Marshall Islands, New Zealand, Papua New Guinea, Qatar, Republic of Korea, Singapore, Thailand, the United Arab Emirates,
- **Europe:** the EU Member States and other member states of the European Civil Aviation Conference (44 countries).

Source: ICAO. 'Response to SL ENV 6/1-16/87: Voluntary Participation of States in the Global MBM Scheme from 2021'. Accessed on 29 September 2016. (Note: the regions are listed for presentational purposes only.)

The ICAO Council will oversee the scheme, supported by the Committee on Aviation Environmental Protection or the standing technical advisory body,¹⁴ and develops criteria for emissions units, the monitoring, reporting and verification (MRV) standards, as well as the setup of a central ICAO registry.¹⁵ MRV is important to ensure that the airlines actually buy sufficient offsets to cover their emissions growth. National governments are responsible for ensuring compliance with CORSIA's requirements.¹⁶ However, at the national level the governance responsibilities have not been defined by the decision. Germany, as a front-runner, is planning to have its emissions trading office coordinate airline participation.

Distribution of offsetting requirements: Airlines (formally called 'aircraft operators' under CORSIA) of participating countries need to fulfil their offsetting requirements in three year compliance cycles beginning in 2021.¹⁷ The general formula for calculating offsetting requirements for each airline is:

'aircraft operator's offset requirement = [% Sectoral × (an aircraft operator's emissions covered by CORSIA in a given year × the sector's growth factor in the given year)] + [% Individual × (an aircraft operator's emissions covered by CORSIA in a given year × that aircraft operator's growth factor in the given year)' ¹⁸

Until 2030, the sectoral share is set at 100%. From 2030–2032 the individual share shall at least be 20%, and from 2033–2035 the individual share shall be at least 70%. The GA to be held in 2028 will specify the share level.¹⁹ Since the sector's growth factor applies only to the growth of emissions covered by the CORSIA, it will not reflect the full growth of the aviation sector. However, applying the sectoral share ensures that airlines participating in CORSIA are not paying for emissions from those airlines that are excluded from the scheme.

While the sectoral approach provides fewer incentives for airlines to reduce their emissions than the individual approach, the latter could result in perverse incentives for operating inefficient airlines before 2020 or focus on domestic routes.²⁰ This might be one of the reasons why the individual approach will only commence in 2030.

A rough calculation of annual offset needs of all participating countries would be 60–170 million tonnes of CO₂ for 2021, increasing linearly over time. Annual demand of 1 billion tonnes of CO₂ would be reached in 2035 for the slow growth path, and already in 2027 for the high growth scenario.

Eligible offset types: The criteria for eligible offset types still need to be developed by the ICAO Council. Offsets from UNFCCC mechanisms can be used for meeting obligations under CORSIA 'provided that they align with decisions by the Council [...] including on avoiding double counting and on eligible vintage and timeframe'.²¹ This could hence apply to offsets generated by the CDM, Joint Implementation or under future market mechanisms of Article 6 of the Paris Agreement such as 'Cooperative Approaches' (Art. 6.2) and the 'Sustainable Development Mechanism' (Art. 6.4). If supply through other offset programmes such as the Verified Carbon Standard is allowed, it could significantly reduce offset prices. The criteria for determining offset eligibility will be defined until 2018.²²

Offset prices range from €0.4/tonne of CO₂ on the secondary CDM market to double digit values in some voluntary niche markets. Primary market prices for CDM credits reach €2.5–4. Given the big built-up supply of CDM credits of close to one billion credits, one can thus safely assume prices in a range between €1 and €5 per offset until significant demand for offsets emerges under the Paris Agreement. This is however unlikely before 2030.

Exemptions from the scheme: Unless countries voluntarily participate, flights from/to Least Developed Countries, Small Island Developing States and landlocked countries will be exempted from the 2nd phase of the CORSIA.²³ Further, countries whose airlines have a share of less than 0.5% of international air traffic volume will be exempted. The same applies to all countries that are not on a list of countries determined as follows: all countries are listed in a descending order according to their share in international air traffic volume until the shares add up to 90%. Then the list is closed.²⁴ Not many countries competing with the UAE and Qatar-based airlines fall in the exemption category. The most relevant case seems to be Ethiopia, with Ethiopian Airlines competing with Middle Eastern airlines on the routes to Africa.

Environmental integrity: As mentioned above, the scope of emissions covered is reduced due to the following facts:

- the scheme only covers the emissions increase compared to 2020, not total emissions;
- the delayed start year (2021 instead of 2020); and
- the very long voluntary phase.

While many countries declared their intent to join from the beginning, countries who voluntarily participate can again decide to leave the scheme by 1 January of any year, after notification at the end of June of the previous year.²⁵ The lack of requirements for the environmental integrity of offsets is highly criticised by NGOs, such as Transport & Environment.²⁶ Yet, since the criteria are still to be developed, there is still a possibility to ensure strong environmental integrity of the offsets. The decision on which type of offset projects will be allowed shall take into consideration UNFCCC developments, including regarding the rules of the market mechanisms under Article 6 of the Paris Agreement. Criteria for emissions units shall be regularly reviewed to ensure their compatibility with decisions taken under the Agreement.²⁷

More than 80 civil society organizations criticised in September 2016 that the CORSIA plans at this point of time would 'undermine our ability to limit warming to the agreed UN aim of well below 2°C, aiming for 1.5°C'.²⁸ One critical question is whether only offsets created in the future can be used or also those created in the past and not cancelled for compliance purposes. The latter approach would allow for the harnessing of the high volume of CDM credits generated since 2012 that could not enter the EU emissions trading scheme.

Review of the scheme: From 2022 onwards a review of the CORSIA shall be conducted every three years.²⁹ The review shall include an assessment regarding the progress made towards achieving the goal of carbon neutral growth, and more importantly it shall also include considerations of the scheme's improvements which could contribute towards the achievement of the Paris Agreement.³⁰ This review cycle is not aligned with the global stocktake cycle of the PA which will take place for the first time in 2023 and afterwards every five years.³¹

The CORSIA in practice: To ensure that the CORSIA will be able to operate from 2021, the ICAO Council has amongst others been tasked to develop criteria for emissions units by no later than 2018, to establish a technical standing advisory committee for emissions units criteria, to develop Standards and Recommended Practices (SARPs) for MRV, to develop guidance on registries which shall be adopted by 2018, to setup a central registry under ICAO and to provide capacity building and financial support related to MRV systems and registries to countries in need of such support.³² Countries will need to determine an authority to which its airlines need to report the necessary data, conduct all necessary arrangements for the MRV system to be implemented in line with the SARPs in January 2019 and ensure all national policies are in place for the scheme by 2020.³³

Implications for the GCC Countries

Implications for the GCC countries: The UAE and Qatar have shown leadership by committing to join the CORSIA from the beginning. These are also the two countries of the GCC countries with the highest share in international air traffic volume. Ideally, other GCC countries would follow their example and join the scheme from the beginning.

Since emissions units of the UNFCCC and Paris Agreement can be used to fulfil CORSIA requirements as long as they fulfil the emission unit criteria which shall be developed, CORSIA could be used to trigger demand for regional offsets, such as from the CDM pipeline. 9.6 million CDM offsets have already been issued for projects in the GCC and the total potential of offset generation until 2020 reaches 33 million.³⁴ The revenue inflow for the project developers could thus reach over €150 million at a price of €5/offset.

Implications for GCC-based airlines: The potential implications for the GCC countries depend on the year when most of the countries with strong aviation activities join the CORSIA. Since the UAE and Qatar intend to join the scheme from the beginning, their airlines will be among the first airlines affected. Both countries together cover 11.5% of total global air traffic volume in 2014, so offset-related costs could reach €7–100 million in 2021 and then increase by the same level every year.

Given the 66 countries who have decided to join the scheme from the beginning include countries with strong international aviation activities such as China, Singapore and Thailand, one can assume that competitive distortions for airlines from the UAE and Qatar remain limited. In addition, it remains to be seen whether the costs for offsets will actually be of relevance compared to other costs faced by airlines given that offset prices are likely to remain low for the foreseeable future due to a high built-up supply. This would especially be the case if the accumulated surplus of CDM credits can be used under the CORSIA. The largest competition may come from Turkey and India which are unlikely to join soon.

Airlines of Bahrain, Kuwait and Oman might be exempted, since in 2014 their country's share of international air traffic volume was 0.19%, 0.2% and 0.24% respectively³⁵ and hence below the 0.5% threshold. Even if these airlines grow rapidly, it would take considerable time for these countries to attain the threshold.

From 2030 onwards, the amount of required offsets per airline depends also on the respective airline's projected growth.³⁶ Thus, the greater the growth of an airline, the greater the amount of offsets it needs to acquire.

Implications of the CORSIA for ministry officials in the UAE: Since the UAE is a member of the ICAO Council until 2019, it has the possibility to actively engage in the tasks identified above for the Council, particularly in order to ensure environmentally sound criteria for emissions units and strong and robust MRV requirements.

Nationally, the UAE needs to ensure that all policies are in place for complying and enforcing the scheme. It further needs to conduct all necessary arrangements for the MRV system to be implemented in line with the SARPs in January 2019.³⁷ For these tasks, the UAE amongst others, needs to determine:

- to which authority airlines should report the relevant data³⁸ and in which frequency;
- which ministry is responsible for monitoring compliance of airlines;
- whether airlines will have to submit a draft compliance plan to any ministry;
- how the UAE will enforce compliance if an airline does not fulfil its offsetting requirements; and
- whether the UAE or GCC countries want to prepare any recommendations with regard to the offset supply of their airlines (for example focusing on supply from CDM projects within the region).

Further, the UAE should closely monitor the SARPs' development, and prepare in advance their implementation in order to be able to implement the MRV system within a short timeframe.

The mechanisms for the reporting from the national authority to the central ICAO registry will most likely be determined by the guidance for registries which is to be developed by the Council.

Recommendations for the UAE government: This Insight recommends that the UAE government:

- conducts a detailed analysis on potential offset needs for its airlines until 2030, as well as offset price scenarios depending on the quality criteria, and eligible offset schemes, in order to inform UAE positions for the negotiations on offset quality criteria;
- proactively engages with CDM project developers in the GCC region to ensure that sufficient offset supply at competitive prices is available to cover GCC airline needs;
- continues the leadership that it has already shown by committing before the ICAO GA to join the CORSIA in the pilot phase, by engaging proactively in the ICAO Council to ensure that the CORSIA will be credible with regards to its environmental integrity. While some countries want to involve offsets from voluntary markets, some of which have had reputation problems in the past, it is the author's view that a limitation of offsets to those from UNFCCC mechanisms would be a crucial step; and
- coordinates with other GCC countries with regard to the development of national approaches to CORSIA. Ideally GCC countries will share their experiences in setting up their national registries and their regulations for compliance and enforcement.

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Endnotes

- 1) ATAG 2016.
- 2) European Commission 2016.
- 3) ICAO 2013 para 19.
- 4) ICAO 2007.
- 5) ICAO, 2013, para 19.
- 6) Beard 2016.
- 7) Ibid.
- 8) Fioretti 2016.
- 9) UAE 2013, p.4.
- 10) Ibid., p.7.
- 11) ICAO 2016c, para 22.3.5.
- 12) ICAO 2016d.
- 13) ICAO 2016b, para 9.
- 14) Ibid., para 20.
- 15) Ibid., paras 15, 18 and 20.
- 16) Ibid., para 20j.
- 17) Ibid., para 16.
- 18) Ibid., para 11a.
- 19) Ibid., paras 11e, iv) and v).
- 20) Vaishnav 2016, see also Petsonk and Piris-Cabezas 2016.
- 21) ICAO 2016b, para 21.
- 22) Ibid., para 20c.
- 23) Ibid., para 9f.
- 24) Ibid., para 9e. The share of international aviation activities is calculated for the year 2018 in the unit Revenue Tonnes Kilometre (RTK). Using 2014 RTK values, this list includes Australia, Austria, Belgium, Brazil, Canada, Chile, China, Colombia, Ethiopia, Finland, France, Germany, India, Indonesia, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Malaysia, Mexico, Netherlands, New Zealand, Norway, Panama, Philippines, Portugal, Qatar, Russia, Saudi Arabia, Singapore, South Africa, Spain, Switzerland, Thailand, Turkey, UAE, UK, USA and Vietnam. See: ICAO 2016a. Finally, the CORSIA will also not apply to airline operators with annually less than 10,000 tonnes of CO₂ emissions resulting from international aviation, to aircrafts with a maximum take of mass below 5.7 tonnes, to new entrants for three years, unless their annual emissions are above 0.1% of total emissions in 2020 or to medical, firefighting or humanitarian flights. See ICAO 2016b, paras 12, 13.
- 25) ICAO 2016b, para 9f.
- 26) Hemmings 2016.
- 27) ICAO 2016b, paras 20c and e.
- 28) 11.11.11. et al. 2016.
- 29) ICAO 2016b, para 9g.
- 30) Ibid., para 18.
- 31) UNFCCC 2015, Art. 14.
- 32) ICAO 2016b, paras 15, 18, 20 and 22.
- 33) Ibid., paras 16 and 20.
- 34) UNEP DTU 2016.
- 35) ICAO 2016a.
- 36) ICAO 2016b, para 11.
- 37) Ibid., para 20.
- 38) Ibid., para 16.